

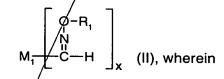




Patent Claims

Alkaline developable, photosensitive composition comprising

- (A) at least one alkaline soluble binder resin, prepolymer or monomer component;
- (B) at least one compound of formula I or II



 R_1 is C_4 - C_9 cycloalkanoyl, C_3 - C_{12} alkenoyl; C_7 - C_{20} alkanoyl which is unsubstituted or substituted by one or more halogen, CN or phenyl; or R_1 is benzoyl which is unsubstituted or substituted by one or more C_1 - C_6 alkyl, halogen, CN, OR_3 , SR_4 or NR_5R_6 ; or R_1 is C_2 - C_{12} alkoxycarbonyl or benzyloxycarbonyl; or phenoxycarbonyl which is unsubstituted or substituted by one or more C_1 - C_6 alkyl or halogen;

Ar₁ is C_6 - C_{20} aryl or C_6 - C_{20} aryloyl, both radicals are unsubstituted or substituted 1 to 12 times by halogen, C_1 - C_{20} alkyl, benzyl, C_1 - C_{20} alkanoyl, C_3 - C_8 cycloalkyl; or said C_6 - C_{20} aryl or C_6 - C_{20} aryloyl is substituted by phenyl or benzoyl each of which optionally is substituted by one or more OR_3 , SR_4 or NR_5R_6 , or said C_6 - C_{20} aryl or C_6 - C_{20} aryloyl is substituted by C_2 - C_{12} alkoxycarbonyl optionally interrupted by one or more -O- and/or optionally substituted by one or more hydroxyl groups; or said C_6 - C_{20} aryl or C_6 - C_{20} aryloyl is substituted by phenoxycarbonyl, OR_3 , SR_4 , SOR_4 , SO_2R_4 or NR_5R_6 , wherein the substituents OR_3 , SR_4 or NR_5R_6 optionally form 5- or 6-membered rings via the radicals R_3 , R_4 , R_5 and/or R_6 with further substituents on the aryl ring of the C_6 - C_{20} aryl or C_6 - C_{20} aryloyl group or with one of the carbon atoms of the aryl ring of the C_6 - C_{20} aryl or C_6 - C_{20} aryloyl group;

or Ar_1 is C_3 - C_9 heteroaryl/provided that R_1 is acetyl, said C_3 - C_9 heteroaryl is unsubstituted or substituted 1 to 7 times by halogen, C_1 - C_{20} alkyl, benzyl, C_1 - C_{20} alkanoyl, or C_3 - C_8 cycloalkyl; or said C_3 - C_9 heteroaryl is substituted by phenyl or benzoyl, each of which optionally is substituted by one or more OR_3 , SR_4 or NR_5R_6 ; or said C_3 - C_9 heteroaryl is substituted by C_2 - C_{12} alkoxycarbonyl optionally interrupted by one or more -O- and/or optionally substituted by one or more hydroxyl groups; or said C_6 - C_{20} aryl or C_6 - C_{20} aryloyl is substituted by phenoxycarbonyl, OR_3 , SR_4 , SOR_4 , SO_2R_4 or NR_5R_6 ;

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gen, C_1 - C_{12} alkyl, C_3 - C_8 cycloalkyl, benzyl; phenyl which is unsubstituted or substituted by one or more OR_3 , SR_4 or NR_5R_6 ; benzoyl which is unsubstituted or substituted by one or more OR_3 , SR_4 or NR_5R_6 ; C_1 - C_{12} alkanoyl; C_2 - C_{12} alkoxycarbonyl optionally interrupted by one or more -O- and/or optionally substituted by one or more OH, phenoxycarbonyl, OR_3 , SR_4 , SO_2R_4 or NR_5R_6 ;

or M_1 , when x is 3, is or M_4 or , each of which optionally

is substituted 1 to 12 times by halogen, C_1 - C_{12} alkyl, C_3 - C_8 cycloalkyl; phenyl which is unsubstituted or substituted by one or more OR_3 , SR_4 or NR_5R_6 ; benzyl, benzyl, C_1 - C_{12} alkanoyl; C_2 - C_{12} alkoxycarbonyl optionally interrupted by one or more -O- and/or optionally substituted by one or more hydroxyl groups, phenoxycarbonyl, OR_3 , SR_4 , SOR_4 , SO_2R_4 or NR_5R_6 ;

M₂ is a direct bond, -O-, -S-, -SS-, -NR₃-, -(CO)-, C₁-C₁₂alkylene, cyclohexylene, phenylene, naphthylene, -(CO)O-(C₂-C₁₂alkylene)-O(CO)-, -(CO)O-(CH₂CH₂O)_n-(CO)- or -(CO)-

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 $(C_2-C_{12}-alkylene)-(CO)-;$ or M_2 is $C_4-C_{12}alkylene$ or $C_4-C_{12}alkylenedioxy-, each of which is optionally interrupted by 1 to 5 -O-, -S- and/or -NP<math>_3$ -;

 M_3 is a direct bond, -CH₂-, -O-, -S-, -SS-, -NP₃- or -(CO)-;

$$M_4$$
 is N , N or N

 R_3 is hydrogen or C_1 - C_{20} alkyl; or R_3 is C_2 - C_{12} alkyl which is substituted by -OH, -SH, -CN, C_3 - C_6 alkenoxy, -OCH $_2$ CH $_2$ CN, -OCH $_2$ CH $_2$ (CO)O(C_1 - C_4 alkyl), -O(CO)- C_1 - C_4 alkyl, -O(CO)-phenyl, -(CO)OH, -(CO)O(C_1 - C_4 alkyl), -N(C_1 - C_4 alkyl) $_2$, or morpholinyl; or R_3 is C_2 - C_1 2alkyl which is interrupted by one or more -O-; or R_3 is -(CH $_2$ CH $_2$ O) $_{n+1}$ H, -(CH $_2$ CH $_2$ O) $_n$ (CO)- C_1 - C_8 alkyl, C_1 - C_8 alkanoyl, C_3 - C_1 2alkenyl, C_3 - C_6 alkenoyl, C_3 - C_8 cycloalkyl; or R_3 is benzoyl which is unsubstituted or substituted by one or more C_1 - C_6 alkyl, halogen, -OH or C_1 - C_4 alkoxy; or R_3 is phenyl or naphthyl each of which is unsubstituted or substituted by halogen, -OH, C_1 - C_1 2alkyl, C_1 - C_1 2alkoxy, phenyl- C_1 - C_3 -alkoxy, phenoxy, C_1 - C_1 2alkylsulfanyl, phenylsulfanyl, -N(C_1 - C_1 2alkyl) $_2$, diphenylamino or -(CO) R_7 ; or R_3 is phenyl- C_1 - C_3 alkyl, or Si(C_1 - C_6 alkyl) $_1$ (phenyl) $_3$ - $_7$;

r is 0, 1, 2 or 3;

n is 1 to 20;

R₄ is hydrogen, C₁-C₂₀alkyl, C₃-C₁₂alkenyl, C₃-C₈cycloalkyl, phenyl-C₁-C₃alkyl; C₂-C₈alkyl which is substituted by -OH, -SH, -CN, C₃-C₆alkenoxy, -OCH₂CH₂CN, -OCH₂CH₂(CO)O(C₁-C₄alkyl), -O(CO)-C₁-C₄alkyl, -O(CO)-phenyl, -(CO)OH or -(CO)O(C₁-C₄alkyl); or R₄ is C₂-C₁₂alkyl which is interrupted by one or more -O- or -S-; or R₄ is -(CH₂CH₂O)_{n+1}H, -(CH₂CH₂O)_n(CO)-C₁-C₈alkyl, C₂-C₈alkanoyl, C₃-C₁₂alkenyl, C₃-C₆alkenoyl; or R₄ is phenyl or naphthyl each of which is unsubstituted or substituted by halogen, C₁-C₁₂alkyl, C₁-C₁₂alkoxy or -(CO)R₇;

 R_5 and R_6 independently of each other are hydrogen, C_1 - C_{20} alkyl, C_2 - C_4 hydroxyalkyl, C_2 - C_{10} alkoxyalkyl, C_3 - C_5 alkenyl, C_3 - C_8 cycloalkyl, phenyl- C_1 - C_3 alkyl, C_1 - C_4 alkanoyl, C_3 - C_{12} alkenoyl, benzoyl; or are phenyl or naphthyl each of which is unsubstituted or substituted by C_1 - C_{12} alkyl or C_1 - C_{12} alkoxy; or R_5 and R_6 together are C_2 - C_6 alkylene optionally interrupted by -O- or -NR $_3$ - and/or optionally substituted by hydroxyl, C_1 - C_4 alkoxy, C_2 - C_4 alkanoyloxy or benzoyloxy;

 R_7 is hydrogen, C_1 - C_{20} alkyl; or is $C_{27}C_8$ alkyl which is substituted by halogen, phenyl, -OH, -SH, -CN, C_3 - C_6 alkenoxy, -OCH₂CH₂CN, -OCH₂CH₂(CO)O(C_1 - C_4 alkyl), -O(CO)- C_1 - C_4 alkyl, -O(CO)-phenyl, -(CO)OH or -(CO)O(C_1 - C_4 alkyl); or R_7 is C_2 - C_{12} alkyl which is interrupted by one or more -O-; or R_7 is -(CH₂CH₂O)_{n+1}H, -(CH₂CH₂O)_n(CO)- C_1 - C_8 alkyl, C_3 - C_{12} alkenyl, C_3 - C_8 cycloalkyl; phenyl optionally substituted by one or more halogen, -OH, C_1 - C_{12} alkyl, C_1 - C_{12} alkoxy, phenoxy, C_1 - C_{12} alkylsulfanyl, phenylsulfanyl, -N(C_1 - C_{12} alkyl)₂, or diphenylamino; and

- (C) a photopolymerizable compound.
- 2. Photosensitive composition according to claim 1, wherein compound (A) is an oligomeric or polymeric compound.
- 3. Photosensitive composition according to claim 2, wherein the photopolymerizable compound (C) is a liquid.
- 4. Photosensitive composition according to claim 1, wherein component (B) is a compound of formula I or II, wherein
- **R**₁ is C₂-C₆alkanoyl or C₂-Ø₅alkoxycarbonyl; or R₁ is benzoyl which is unsubstituted or substituted by one or more C₁-C₆alkyl or halogen;
- Ar₁ is phenyl or naphthyl,

each of these radicals is unsubstituted or substituted 1 to 5 times by halogen, C_1 - C_{20} alkyl, benzyl or C_1 - C_{20} alkanoyl; or said phenyl or naphthyl is substituted by phenyl or benzoyl, each of which optionally is substituted by one or more OR_3 , SR_4 or NR_5R_6 ; or said phenyl or naphthyl is substituted by C_2 - C_{12} alkoxycarbonyl optionally interrupted by one or more -O-and/or optionally substituted by one or more OR_3 , OR_4 or OR_5R_6 , wherein the substituents OR_3 , OR_4 or OR_5R_6 optionally form 5- or 6-membered rings Via the radicals OR_3 , OR_4 and/or OR_6 with further substituents on the phenyl or naphthyl ring or with one of the carbon atoms of the phenyl or naphthyl ring;

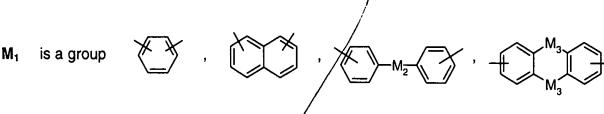
or Ar₁ is furyl, pyrrolyl, thienyl, benzofuranyl, indolyl, benzothiophenyl or pyrridyl, provided that R₁ is acetyl; wherein each of these radicals is unsubstituted or substituted 1 to 4 times by halogen, C_1 - C_{20} alkyl, benzyl, C_3 - C_8 cycloalkyl, phenyl, C_1 - C_{20} alkanoyl, benzoyl, C_2 - C_{12} alkoxycarbonyl, phenoxycarbonyl, OR_3 , SR_4 , SO_2R_4 or NR_5R_6 ;

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or
$$M_2$$
, each of which optionally is substituted 1 to 4 times by

halogen, C_1 - C_{12} alkyl, benzyl, OR_3 , SR_4 or NR_5R_6 ; or by phenyl which is unsubstituted or substituted by one or more OR_3 , SR_4 or NR_5R_6 ; or by benzoyl which is unsubstituted or substituted by one or more OR_3 , SR_4 or NR_5R_6 ; or by C_1 - C_{12} alkanoyl; or by C_2 - C_{12} alkoxycarbonyl optionally interrupted by one or more -O- and/or optionally substituted by one or more hydroxyl groups;

 M_2 is a direct bond, -O-, -S-, -SS-, -NR₃-, -(CO)-, C₁-C₁₂alkylene, phenylene, -(CO)O-(C₂-C₁₂alkylene)-O(CO)-, -(CO)O-(CH₂CH₂O)_n-(CO)- or -(CO)-(C₂-C₁₂-alkylene)-(CO)-; or M₂ is C₄-C₁₂alkylene or C₄-C₁₂alkylenedioxy-, each of which is optionally interrupted by 1 to 5 -O-, -S- and/or -NR₃-;

 M_3 is a direct bond / -CH₂-, -O-, -S-, -NR₃- or -(CO)-;

 $\begin{array}{lll} \textbf{R}_3 & \text{is hydrogen or/} C_1\text{-}C_{20} \text{alkyl}; & \text{or } R_3 \text{ is } C_2\text{-}C_{12} \text{alkyl} \text{ which is substituted by -OH, -SH, } \\ -\text{O(CO)-} C_1\text{-}C_4 \text{alkyl} & -\text{O(CO)-} \text{phenyl, -}(\text{CO)O(}C_1\text{-}C_4 \text{alkyl}), -\text{N(}C_1\text{-}C_4 \text{alkyl})_2, -\text{N(}CH_2\text{CH}_2\text{OH})_2, } \\ -\text{N[} CH_2\text{CH}_2\text{O-}(\text{CO)-} C_1\text{-}C_4 \text{alkyl}]_2 \text{ or morpholinyl; } & \text{or } R_3 \text{ is } C_2\text{-}C_{12} \text{alkyl} \text{ which is interrupted by one or more -O-} \\ & \text{or } R_3 \text{ is -}(\text{CH}_2\text{CH}_2\text{O})_{n+1}\text{H, -}(\text{CH}_2\text{CH}_2\text{O})_n(\text{CO)-}C_1\text{-}C_8 \text{alkyl, phenyl-}C_1\text{-}C_3 \text{alkyl, } \\ & \text{C}_2\text{-}C_8 \text{alkanoyl, } C_3\text{-}C_{12} \text{alkenyl or } C_3\text{-}C_6 \text{alkenoyl; } \\ & \text{or } R_3 \text{ is benzoyl which is unsubstituted or substituted by one or more } C_1\text{-}C_6 \text{alkyl, halogen or } C_1\text{-}C_4 \text{alkoxy; } \\ & \text{or } R_3 \text{ is phenyl or naphthyl each of which is unsubstituted or substituted by halogen, } C_1\text{-}C_{12} \text{alkyl, } C_1\text{-}C_{12} \text{alkoxy, phenyl-} \\ & \text{C}_1\text{-}C_3\text{-alkoxy, phenoxy, } C_1\text{-}C_{12} \text{alkylsulfanyl, phenylsulfanyl, -N(} C_1\text{-}C_{12} \text{alkyl)}_2, \text{ diphenylamino or -}(\text{CO)} R_7; \\ \end{array}$

n is 1 t ϕ 20;

R₄ is hydrogen, C₁-C₂₀alkyl, C₃-C₁₂alkenyl, phenyl-C₁-C₃alkyl; C₂-C₈alkyl which is substituted by -OH, -SH, -O(CO)-C₁-C₄alkyl, -O(CO)-phenyl or -(CO)O(C₁-C₄alkyl); or R₄ is C₂-C₁₂alkyl which is interrupted by one or more -O- or -S-; or R₄ is -(CH₂CH₂O)_{n+1}H, -(CH₂CH₂O)_n(CO)-C₁-C₈alkyl, C₂-C₈alkanoyl, C₃-C₁₂alkenyl, C₃-C₆alkenoyl; or R₄ is phenyl or naphthyl each of which is unsubstituted or substituted by halogen, C₁-C₁₂alkyl, C₁-C₁₂alkoxy

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R₅ and R₆ independently of each other are hydrogen, C₁-C₂₀alkyl, C₂-C₄hydroxyalkyl, C₂-C₁₀alkoxyalkyl, phenyl-C₁-C₃alkyl, C₁-C₄alkanoyl, C₃-C₁₂alkenoyl, benzoyl; or are phenyl or naphthyl each of which is unsubstituted or substituted by C1-C12alkyl or C1-C12alkoxy; or R5 and R₆ together are C₂-C₆alkylene optionally interrupted by -O- or -NR₃- and/or optionally substituted by hydroxyl, C₁-C₄alkoxy, C₂-C₄alkanoyloxy or benzoyloxy; and

is hydrogen, C₁-C₂₀alkyl; or is C₂-Q₈alkyl which is substituted by halogen, phenyl, -OH, -SH, C_3 - C_6 alkenoxy, -O(CO)- C_1 - C_4 alky $\sqrt{ }$, -O(CO)-phenyl or -(CO)O(C_1 - C_4 alky $\sqrt{ }$); or R_7 is C_2 - C_{12} alkyl which is interrupted by one ϕ r more -O-; or R_7 is -(CH₂CH₂O)_{n+1}H, -(CH₂CH₂O)_n(CO)-C₁-C₈alkyl or C₃-C₁₂alkenyl; or is placely optionally substituted by one or more halogen, C₁- C_{12} alkyl, C_1 - C_{12} alkoxy, phenoxy, \cancel{C}_1 - C_{12} alkylsulfanyl, phenylsulfanyl, -N(C_1 - C_{12} alkyl)₂, or diphenylamino.

5. Photosensitive composition according to claim 1, wherein component (B) is a compound of formula 1 or 11, wherein

is C₂-C₄alkanoyl; R₁

is phenyl or naphthyl, each of which is unsubstituted or substituted by halogen, C₁-C₈alkyl, NR₅R₆ or OR₃, wherein the substituents OR₃, optionally form 5- or 6-membered rings via the radicals ₱3 with further substituents on the phenyl or naphthyl ring; or Ar1 is 2furyl, 2-pyrrolyl, 2-thienyl, 3-indolyl, provided that R₁ is acetyl;

 M_1 is

is 2; X

is C₁-C₂₀Alkyl; or R₃ is C₂-C₁₂alkyl which is substituted by OH, -O(CO)-C₁-C₄alkyl, $-N(C_1-C_4alkyl)_2$, $-N(CH_2CH_2OH)_2$, $-N[CH_2CH_2O-(CO)-C_1-C_4alkyl)$ or morpholinyl; or R_3 is C₂-C₁₂alkyl which is interrupted by one or more -O-; or R₃ is -(CH₂CH₂O)_{n+1}H or -(CH₂CH₂O)_n(CO)-C₁-C₄alkyl;

is 1 to 3; and

R₅ and R₆ are C₁-C₄alkyl.

6. Photosensitive composition according to claim 1, wherein the oligomer or polymer (A) is a binder polymer.

- 7. Photosensitive composition according to claim 6, wherein the binder polymer is a copolymer of (meth)acrylate and (meth)acrylic acid, or a resin obtained by the reaction of a saturated or unsaturated polybasic acid anhydride with a product of the reaction of an epoxy compound and an unsaturated monocarboxylic acid, or is an addition product formed between a carboxyl group-containing resin and an unsaturated compound having an α,β -unsaturated double bond and an epoxy group.
- 8. Photosensitive composition according to claim 1, which additionally to the components (A), (B) and (C) comprises at least one photosensitizer compound (D).
- 9. Photosensitive composition according to claim 7, comprising 100 parts by weight of component (A), 0.015 to 120 parts by weight of component (B), 5 to 500 parts by weight of component (C) and 0.015 to 120 parts by weight of component (D).
- 10. Photosensitive composition according to claim 1, comprising further additives (E), which are selected from the group consisting of epoxy compounds, thermal polymerization inhibitors, inorganic fillers, colourants, epoxy curing agents, amines, chain transfer agents, thermal radical initiators, photoreducable dyes, optical brighteners, thickeners, antifoaming agents and leveling agents, in particular inorganic fillers.
- 11. Photosensitive composition according to claim 1, additionally comprising an epoxy compound which contains at least two epoxy groups in the molecule.
- 12. Solder resist comprising a composition according to claim 1.
 - 13. Color filter resist comprising a composition according to claim 1.
- 14. Process for the photopolymerization of compounds containing ethylenically unsaturated double bonds, which comprises irradiating a composition according to claim 1 with electromagnetic radiation in the range from 150 to 600 nm.
- (15) Coated substrate which is coated on at least one surface with a composition according to claim 1.

- 16. Process for the production of relief images, wherein a coated substrate according to claim 15 is subjected to imagewise exposure with electromagnetic radiation in the range from 150 to 600 nm, and then the unexposed portions are removed with a solvent.
- 17. A color filter prepared by providing red, green and blue (RGB) color elements and, optionally a black matrix, all comprising a photosensitive composition according to claim 1 and a pigment on a transparent substrate and providing a transparent electrode either on the surface of the substrate or on the surface of the color filter layer.
- 18.) Process for forming images, wherein
- (1) the components of a composition according to claim 1 are mixed,
- (2) the resulting composition is applied to the substrate,
- (3) the solvent, if present, is evaporated, at elevated temperature,
- (4) the coated substrate is patternwise exposed to irradiation,
- (5) the irradiated sample is developed with aqueous alkaline solution, thereby removing the uncured areas and
- (6) the sample is thermally cured.